CLASSIFICATION RESTRICTED
SECURITY INFORMATION
CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT
CD NO.

STAT

COUNTRY	USSR	DATE OF INFORMATION	1947 - 1951
SUBJECT	Scientific - Engineering, research organizations, welding		
HOW PUBLISHED	Monthly periodical	DATE DIST.	22 Jul 1952
WHERE PUBLISHED	Moscow	NO. OF PAGES	4
DATE PUBLISHED	Mar 1952		
LANGUAGE	Russian	SUPPLEMENT TO REPORT NO.	

THIS IS UNEVALUATED INFORMATION

SOURCE Avtogennoye Delo, No 3, 1952, pp 1-5.

VNIIAvtogen (ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF WELDING AND CUTTING OF METALS), 1947 - 1951

A. N. Shashkov
Dir, VNIIAvtogen

The purpose of this paper is to give information on the activity of VNII-Avtogen during the 5 years since a report on the initial stage of its existence was published in Avtogennoye Delo, No 3, 1947.

The institute's activity during this period embraced works in the field of oxygen severing and surface cutting, gas welding, gas-pressure welding, soldering with flame heating, flame hardening, and gas metallization. Secondary works included construction of acetylene generators, development of communication and regulating equipment, electrometallization and arc welding in inert gases.

In accordance with the scope of its activity, the organization of the institute includes a division of research laboratories, a design division, a technical division, a production-experimental shop, a division of technical information, and administrative-economic organs.

The division of research laboratories controls 11 laboratories. The laboratory of flame processes studies the basic technology of severing and surface cutting, gas and gas-pressure welding, and specialized equipment. The latter is designed according to technological data obtained in this laboratory.

General-purpose machines and equipment used in basic industrial processes are studied and brought to the operational stage in the laboratory of equipment.

There are specialized laboratories for work in the fields of metallization, flame hardening, electric arc welding and welding materials. The electromechanical laboratory takes care of electrical equipment for machines. The laboratory of acetylene and gases deals with the problems of investigating acetylene, substitute gases, and apparatus for their production. General-purpose laboratories are represented by the metallographic, chemical, and mechanical testing laboratories.

CLASSIFICATION RESTRICTED

STATE	X	NAVY	X	NSRB		DISTRIBUTION
ARMY	X	AIR	X	FBI		

STAT

The design division consists of the following groups: design of machines and automatic machines, flame and regulating equipment, and acetylene generators and acetylene equipment.

The technical division determines the subjects to be studied, and evaluates the effectiveness of projects and the utilization of their results. It has a technological sector, and sectors of engineering-economical investigations and technical records.

VNIIAvtogen works in cooperation with plants and scientific research organizations such as the Section of Electrical Welding and Electrothermy of the Academy of Sciences, Moscow Higher Technical School imeni Bauman, the Central Scientific Research Institute of Ferrous Metallurgy, the All-Union Scientific Research Institute of Oxygen Machine Building, Moscow Aviation Technological Institute, plants of Glavkislorod, the Podol'sk and Sumy machine building plants, Gor'kiy Automobile Plant, and many others.

The institute brings together a number of specialists in various fields, including the following: gas welding and cutting of metals -- D. L. Glizmanenko, Candidate Technical Science, I. V. Barinovskiy; acetylene and generators -- .. I. Strizhevskiy and V. A. Koval'skiy, Candidates Technical Science; oxygen cutting -- S. G. Guzov and O. Sh. Spektor, Stalin Prize winners; designers and researchers -- V. K. Deykun, O. F. Novikov, I. A. Antonov, Yu. V. Kurlovich, A. K. Finburg, A. I. Korovin, A. K. Krzhechkovskiy; metallization -- Ye. V. Antoshin; equipment -- P. A. Kolyzhenkov, Stalin Prize winner A. N. Kazanskiy, V. D. Nechayev; and argon arc welding -- Ts. S. Khromova. Members of the institute published 53 works in periodicals during the period 1946 - 1951.

The production-experimental shop makes test specimens and produces new items in pilot lots, providing for a check on new designs under production conditions. For 1950, the shop released 83 new items and fabricated six experimental pieces of equipment. Some data on basic problems, worked out in the institute, are given below.

Oxygen Cutting

The greatest efforts were directed toward mechanization and automatization of the oxygen cutting process. The complexity of this problem was emphasized by the necessity for satisfying diverse technical requirements of various industries with a limited number of machine types which could be fabricated expediently.

Systematization of data on this subject created a basis for developing the standard GOST 5614-51, classifying basic types of oxygen cutting machines. All machines are divided into groups of stationary and portable types, according to their main operations and size of operational area.

Stationary machines developed by the institute are given in the following table.

	Classification by Working Area Dimensions		
Operations	To 1,000 mm	To 1,500 mm	To 2,500 mm
Cutting of blanks and preparation of edges	Machine ALP-1 ready for production	Machine ASP-1 in production	Machine AT-2 ready for production
Precision cutting of parts for machine building	Machine APSh-1 in production	Machines ASSh-1 and ASSh-2 in production	In design stage
Multiple cutting of parts	Machine M-10-1 in design stage	Proposed for development	Not specified by GOST

STAT

In all designs, the institute attempted to combine advanced technique with dependability and simplicity in operation. The machines have electrical control, are adapted for magnetic profiling, possess sufficiently high precision, etc. The ASP-1 machine may be fitted with a photoelectric profiling device. Some machines incorporate technical improvements used for the first time in oxygen cutting machines, such as magnetic fastening of master forms, vertical position of master forms, and centralized electromagnetic control of gases in the AT-2 machine and others.

Portable machines for oxygen cutting differ mainly by the number of cutting torches. The C-4 cutting machine developed in 1947 was replaced in 1949 by PL-1 single-cutter and PL-2 double-cutter machines. A new principle of mechanization was realized in a device, PMP, with spring mechanical drive. The absence of an electric drive and its low moisture sensitivity permit the machine to be used in the open areas of construction sites.

The institute also designed a number of special-purpose machines; TR-1 for cutting pipe ends, MRVP-1 for cutting out holes in a vertical plane, SG-2 self-propelled head for cutting along a guiding rail, and others.

A study of oxygen cutting technology resulted in the development of three-torch cutting of edges, improvement of machine cutting torches, establishment of technical indexes for the process, and the recently realized high-speed cutting.

An investigation of surface cutting revealed regularities in the process and led to development of cutting torches RVP-48, RVP-49, RPA, and RPK, widely used in the metallurgical industry for melting out the defects of steel castings and rolled stock.

The institute has designed in the past and continues to design equipment for surface flame cleaning of hot rolled stock.

The introduction of fluxing admixtures permitted use of the oxygen cutting process for high-chromium steel, cast iron, copper, and its alloys. Special equipment for this process, URKhS, is in use at many plants. In 1951, the institute was awarded a Stalin Prize for its development.

Positive results were obtained by the institute in an investigation of cutting using substitutes for acetylene. Cutting torches URZ, RZP, and RPK use natural gases and also combustible gases obtained in petroleum refining and other processes.

Processes with Surface Heating by a Gas Flame

All processes involving gas-flame treatment of metals, such as gas welding, gas-pressure welding, and flame hardening, are based on surface heating, using empirically established regularities which, due to their limitation, hampered further technical development of processes. To overcome the shortcoming, the institute conducted a number of works under the supervision of Professor N. N. Rykalin, Doctor of Technical Sciences, establishing a theoretical basis for utilization and distribution of the heat during gas flame heating (N. N. Rykalin, M. Kh. Shorhorov, "Heating Metals with Oxyacetylene Flame," Avtogennoye Delo, No 7, 1948; and "Influence of Certain Parameters on the Effective Power of Oxyacetylene Flame," Avtogennoye Delo, No 9, 1950).

In the field of gas welding the institute carried out a study of automatic high-speed welding of pipes. The results are now being investigated under industrial conditions. A new improved welding torch, GS-49, was also designed (V. D. Nechayev, "Investigation of the Flame Power of Welding Torches," Avtogennoye Delo, No 12, 1949).

STAT

More attention must be paid to gas-pressure welding technology and equipment. There are also important problems to be solved in the field of flame hardening. The designing of automatic equipment for hardening the teeth of spur gears was the most essential work in this field. Other designs, for example, flat torches for hardening, or equipment for hardening railroad rails and frogs, solve individual problems, but do not satisfy all industrial requirements.

Metallization and Arc Welding

The activity of the institute improved metallization technology considerably, eliminating a great variety of equipment and designing more efficient and standardized units for spraying metals by electric arc or gas flame. Metal spraying guns EM-1 and GIM-1 are in mass production. The latter type uses low-pressure acetylene for the first time in metallization practice.

The high-production metal spraying electric gun EM-6 is ready for fabrication.

A new method, coating with powdery fusible plastics of low-melting metals using a UPN-1 installation, was developed by the institute.

As for arc welding, the institute works on the utilization of protective inert gases and the application of welding in the fabrication of oxygen equipment. As a result, the technology of argon-arc welding of copper and its alloys was studied and introduced to industry (Ts. S. Khromova, "Argon-Arc Welding of Copper," Avtogennoye Delo, No 7, 1950).

A new method was developed for welding copper and its alloys using nitrogen as a protective gas. This method, giving quality results similar to those obtainable with argon, considerably decreases the cost of welding (A. N. Shashkov, Ts. S. Khromova, "Nitrogen-Arc Welding of Copper," Avtogennoye Delo, No 9, 1951).

Gas Equipment

The institute's most important achievement in this field was the development of new, improved acetylene generators. A design innovation is the utilization of a new principle of interaction between calcium carbide and water, in which the water-to-carbide and recession systems are combined. Altogether, the institute developed more than ten designs of generators with a productive capacity from 1.25 to 75 cu m per hour.

To eliminate the transportation cost of gas cylinders, a low-power compressor installation was constructed for filling cylinders at the point of gas consumption. The output of the installation amounts to 8-25 cylinders per day, depending on the number of working shifts.

Several projects were carried out with substitute gases for acetylene. Design methods for equipment using substitute gases were established and sets of feeding and regulating equipment developed.

- E N D -